

Status and Availability of M/A-COM Descrambling Equipment

One of the major concerns that had been raised as we approached the January 15 start date for full time scrambling by HBO was the availability of descramblers. In late 1984 and early 1985, we had shipped some 10,000 descramblers to CATV headends for testing of the system, but there were concerns raised by dealers and consumers that we would not be able to meet the demand for consumer descramblers.

Among the terms of our contracts with HBO and Showtime was a commitment to have an adequate number of descramblers available for sale to consumers as the demand developed. Among the commitments we made were the availability of the first 25,000 units by January 15, the first 100,000 by May 30 and the second 100,000 units by the end of 1986. We purchased the parts for these last year and are well underway in production. Prior to and during the week of January 15, when HBO began scrambling full time, we were able to ship all the descramblers that our distributors had requested, and we are continuing to ship descramblers as additional requests come in. By February 14, we had shipped more than 20,000 descramblers, and that number continues to increase. We have thousands of units in inventory in North Carolina.

We constructed a manufacturing center in Puerto Rico during 1985 in order to meet these levels and more. Our plant in Puerto Rico can produce up to 50,000 descramblers a month if demand develops to that level.

In addition, we have the capability and parts to produce up to 100,000 VideoCipher^(R) II circuit modules for installation in the next generation of HTVRO receivers. We have begun manufacturing these and can have the entire 100,000 available for delivery later this year. We are awaiting orders from the receiver manufacturers to begin delivery of these modules.

M/A-COM's VideoCipher^(R) II descramblers are widely available through retailers of home TVRO equipment throughout the country, and also through some CATV operators. We have not generally sold directly to consumers, but we distribute our products through over thirty wholesalers and distributors. However, for a limited period of time, we are establishing a direct sale program so that any consumers who are unable to locate descramblers can call us directly to order one. We want to make it clear that we are committed to distributing these units as widely as possible, so that consumers should have no problem in finding and purchasing them.

Another concern that some had raised was M/A-COM's ability to charge monopoly prices for the descramblers. M/A-COM is not in a position to exercise monopoly control of the VideoCipher^(R) II technology. One aspect of our contracts with the programmers requires us to license second-source manufacturers of the descrambler modules. We have entered into negotiations with several electronics manufacturers and at this time we have reached agreements with one second-source manufacturer.

This simply illustrates the normal working of the competitive marketplace where proprietary technical standards are involved. By requiring these contractual commitments, the program suppliers were careful to deprive us of monopoly control over the technology. They knew that they would be at an economic disadvantage if VideoCipher^(R) II became a de facto industry standard and M/A-COM retained complete control over the manufacture and distribution of the scrambling hardware, so they did not allow it to happen. The result is that a wide variety of HTVRO receivers will incorporate the VideoCipher^(R) II descrambling module, and that module itself will be competitively produced by multiple manufacturers.

That result will benefit American consumers in the form of lower equipment prices. The retrofit unit now available in the market has a suggested retail price of \$395. The module, when it is incorporated into HTVRO receivers, should result in a price increase of only about \$175 over receivers without the module. If competitive second-source manufacturers are more adept with high volume manufacturing of the modules than M/A-COM, the price may go even lower. Moreover, based on our understanding of the marketing plans of programmers and their sales affiliates, we expect the monthly charges for programming to be quite reasonable.

Consumer Perception and the Current State of the Market

As you may have read recently, the HTVRO market has slowed considerably. HTVRO sales are down substantially from last year. While this has happened in

part due to bad weather and in part due to the beginning of full-time scrambling by HBO, we believe that the major reason for this market downturn is consumer confusion.

If the home TVRO industry spoke with a single clear voice, consumers would understand that scrambling has begun in an orderly fashion. They would understand that descramblers are widely available. They would understand that they need only a single decoder to unscramble all of the scrambled programming. They would understand that the programming will be available at a fair price.

But the industry does not speak with a single clear voice. There are strident voices that continue to complain about descrambler availability and compatibility, about programming pricing and availability, about lawsuits and about legislation. Consumers are confused by these controversial voices, and they are hesitant to purchase earth stations while the controversy exists.

M/A-COM is doing its part to try to stem consumer confusion so that this industry can develop in the way the Congress intended. We are establishing a Scrambling Information Channel on one of the Westar satellites to inform dealers and consumers about scrambling timetables and the installation, operation and availability of descramblers.

Our Scrambling Information Channel will review the scrambling plans of each of the programmers. It will carry up-to-date information on the

availability of descramblers. It will provide step-by-step installation instructions and describe the scrambling system features.

The M/A-COM Scrambling Information Channel will begin operation in early March 1986 with three hours of unscrambled prime time programming. Additional hours of programming will be added if demand warrants.

The industry does not benefit from consumer confusion. M/A-COM does not benefit. The consumers do not benefit. We hope to dispel the misinformation that has been spread by the strident voices of our industry, in order to eliminate consumer confusion and re-establish the HTVRO industry in its rightful role in the video distribution marketplace.

Summary and Conclusion

All of the satellite video programmers who have chosen a scrambling system have chosen the VideoCipher^(R) II system. As a result, consumers will not need to purchase multiple descramblers if they want to subscribe to multiple programming services.

The descrambler hardware is now available and will continue to be available from a wide variety of retail sources. The compatibility of the VideoCipher^(R) II module with the next generation of HTVRO receivers, coupled with the competitive second-source manufacturing of those modules, will assure that equipment prices are reasonable.

It is in M/A-COM's best interest to seek the widest market possible for these descramblers. We believe that it is in the best interest of satellite video programmers to market their programming to HTVRO owners at reasonable prices in order to maximize their revenues and profits. This is the way the free enterprise system has worked throughout the history of our country, and it has worked to the benefit of the American consumer.

The legislation now pending before this subcommittee would interfere with the working of that marketplace. It would hurt M/A-COM, it would hurt the satellite video programmers, and in the long run it would deprive HTVRO owners of the programming that they are willing to pay a reasonable price to receive today.

I thank you for the opportunity to appear before you, and I would be pleased to answer any questions you might have.

DECTEC INTERNATIONAL INC.

THE SUN SYSTEM

1991

DECTEC International Inc.

Sidney, British Columbia, Canada

- **Invested \$2.5 million in research and development.**
- **A growing business committed to worldwide applications.**
- **Current corporate structure and goals:**
 - › **20 employees**
 - › **high funding ratio for an aggressive research & development program**
 - › **Design & development of digitally-based advanced telecommunications products for commercial and consumer markets**
- **Primary technologies:**
 - › **Satellite and cable encryption and cryptography**
 - › **Digital and analog compression**
 - › **Microwave and broadcast transmission and encryption**

DECTEC Current Products

- **Secure Universal Norm Scrambling System:**

- › **S.U.N. descrambling module for satellite broadcasting**
- › **VCDN1.0 Smart-chip:** *downloadable firmware to power-up and re-configure logic cells in S.U.N. modules for descrambling video and audio signals processed through a Videocipher II encryption headend. Software requires S.U.N. modules to be authorized prior to decryption. This software is being upgraded into DVC1.0 version for release May 1, 1991.*

- **Sound Encryption by Random Frequency Selection**

- › **Scrambling and descrambling system for microwave/wireless transmission systems**
- › **Authorization firmware/software for wireless subscription users**

DECTEC Products Under Development

- **S.U.N. system data teleport:** *independent program subscription system to authorize S.U.N. modules through efficient and easy-to-use terrestrial based addressing system or via satellite.*
- **S.U.N. system universal encryption head end:** *encodes and scrambles video/audio signals. Capable of being adapted to several formats for various transmission environments.*
- **DVC/O1.0 Smart-chip:** *downloadable firmware which re-configures logic cells in S.U.N. modules for descrambling video and audio signals processed through either a Videocipher II encryption headend or an Oak headend.*
- **DPlus1.0 Smart-chip:** *downloadable firmware to powerup and configure logic cells in S.U.N. modules for descrambling video and audio signals processed through a Videocipher II Plus scrambling scheme.*
- **DSUN1.0 Smart-chip:** *downloadable firmware to descramble signals encrypted in the S.U.N. proprietary scrambling mode which utilizes polynomial generated numbers so product may be exported out of the United States and Canada for use in markets throughout the world.*

The Secure Universal Norm Scrambling System Provides a Unique and Prosperous Business Opportunity for Manufacturers of Integrated Receiver Descramblers

- **Control manufacture, production, supply and cost of descrambler modules:**
 - › reduce cost of descrambler module in IRD
 - › eliminate instability in product availability
 - › decrease dependency on outside companies
 - › enable inhouse service and repair on all parts within IRD
- **Expand IRD product line to serve distance learning and private network markets with flexible, re-configurable system architecture.**
- **Help development of next-generation field programmable receiver descramblers.**
- **Lower IRD manufacturing and re-tooling costs.**

SUN Scrambling System

(fundamental product concepts)

- **Universal, Open Architecture** *(backward and forward compatibility)*
- **Re-configurable on-the-fly**
- **Flexible**
 - **Impulse Pay Friendly** *(addressability, modem hookup, Eidak compatible)*
 - **Pal, NTSC, Secam configurable**
 - **DES or Polynomial (Non-DES)**
 - **Hard video/audio scrambling**
- **Secure**
- **Off-the-shelf componentry** *(for cost efficient manufacture and repair)*

Re-Configurable Logic Structure

- **Logic Cell Array** *(high speed reprogrammable digital device designed to replace hardwired custom VLSI integrated circuit)*
- **S.U.N. Design Process** *(proprietary configuration of LCA architecture which allows utilization rates close to the theoretical maximum).*
- **Downloadable firmware**
- **Advantages of LCA over VLSI:**
 - › offers a flexible and adaptable mechanical infrastructure which receives on power-up descriptions of processes and functions through software loaded into the machine through smart-cards or smart-chips.
 - › product can be changed while it is in-the-field through issuance of new smart cards.
 - › security schemes and encryption control codes can be quickly and easily re-defined to enhance security.
 - › modules can be easily and inexpensively customized to meet specific needs of independent networks and users.

Advanced Security Features

● **Protection of authorization control data**

- **Dallas DS2250 self-encrypted memory and closed loop system with encrypted timer clock**
- **on-going security developments** (*including adding security relationships within a common architecture*)
- **same microprocessor provides security in German automatic banking systems**
- **could not be broken by competitors or reverse engineering specialists**

● **Encryption**

- **Digital audio, and sync Inverted video located in LCA enabling regular update of field sync pattern. Hard video option**
- **can enhance security of current encryption systems at headend**
- **re-configurable** (*data recovery, error correction, and digital-to-analog conversion is function of re-programmable LCA*)
- **has the capacity, if required, to maintain unique keywords for every channel.**
- **can run more than one encryption system or switch between various systems on demand.**

Why S.U.N.?

- **Ready now.**
- **Easy to manufacture at substantially lower cost.**
- **Universal standard interface to comply with FCC interest.**
- **Supports increase use of satellite communications on a global basis:**
 - › **adaptable transmission format**
 - › **exportable**
- **Provides an easy transition from obsolete systems to newer scrambling technologies.**
- **Secure.**
- **Compression compatible.**
- **Easy to authorize.**

Unique System Features

● Multi-Format:

- › **can run several scrambling systems simultaneously** *(automatically identifies and descrambles signal without participation from viewer)*
- › **can be configured to operate in any transmission environment**

● Re-programmable Security

- › **keywords**
- › **control data within smart-card**
- › **algorithm and encryption scheme at headend**

● Customizable

- › **flexible channel configuration** *(system's memory can be expanded through removeable microprocessor card)*
- › **modular** *(can add-on and interface telephone modem, PC, printer, compression box, other)*
- › **expandable audio, data features**

Specific System Features Currently available through SUN

(VCDN1.0 or DVC1.0 and DVC/O1.0 SUN software versions)

● **Authorization:**

- › holds 5,000 independent channels configured in common key format or 256 independent private networks with unique keys.
- › standard authorization rate of 300,000 homes (or sites) per minute through the DECTEC teleport.
- › through current authorization stream, smart-card, universal teleport, shared authorization center, private authorization facility, or terrestrial system.

● **Scrambling and Encryption:**

- › operated through reprogrammable LCAs where sync pulses within inverted video signals are replaced with unique and nonrepetitive digital data
- › operated through reprogrammable LCAs, audio is pre-emphasized, digitized and encrypted with continuously changing keyword.

● **Descrambling and Decoding:**

- › descrambles video and audio signals scrambled through a Videocipher encoder if the SUN unit is authorized to decode the signal

Specific System Features, 2

(VCDN1.0 or DVC1.0 and DVC/O1.0 SUN software versions)

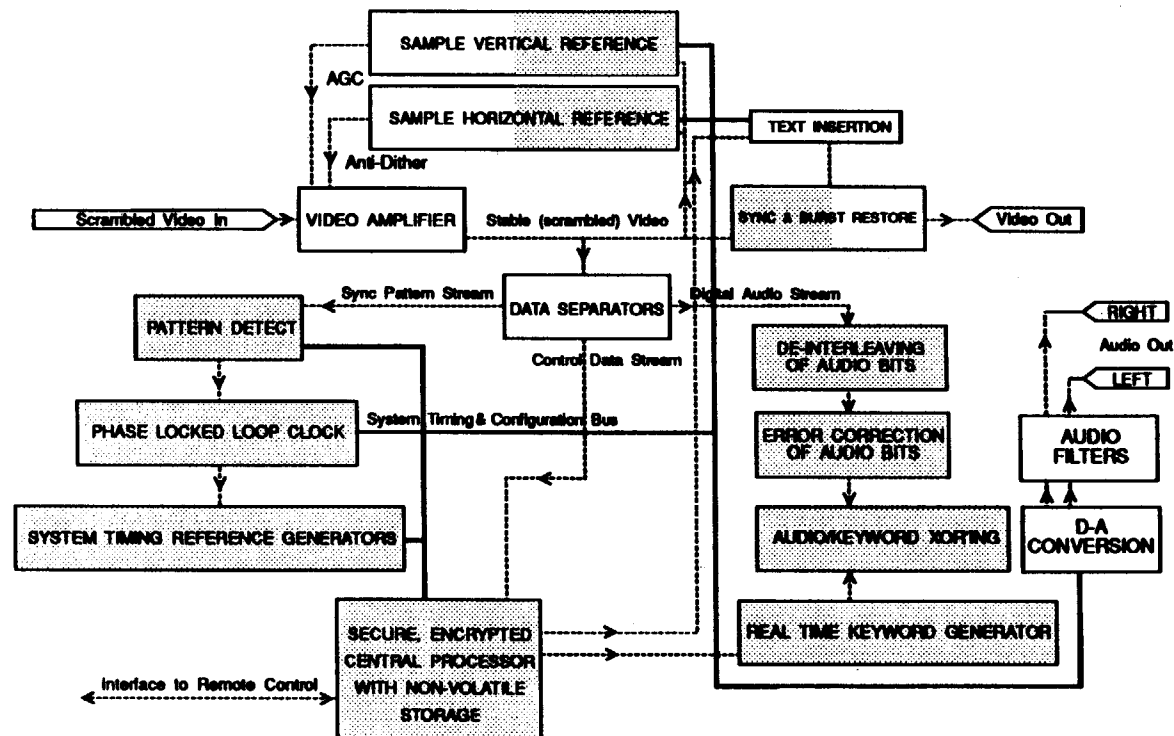
- **Security:**

- › control data is secured within a self-encrypting static RAM memory chip through a proprietary method of code and authorization entry.
- › keys created, controlled, and updated/changed by programmer.

- **Enhanced Video/Improved Sound**

- › during beta-testing phase, viewers reported improved picture and audio quality through SUN.

SUN System Architecture

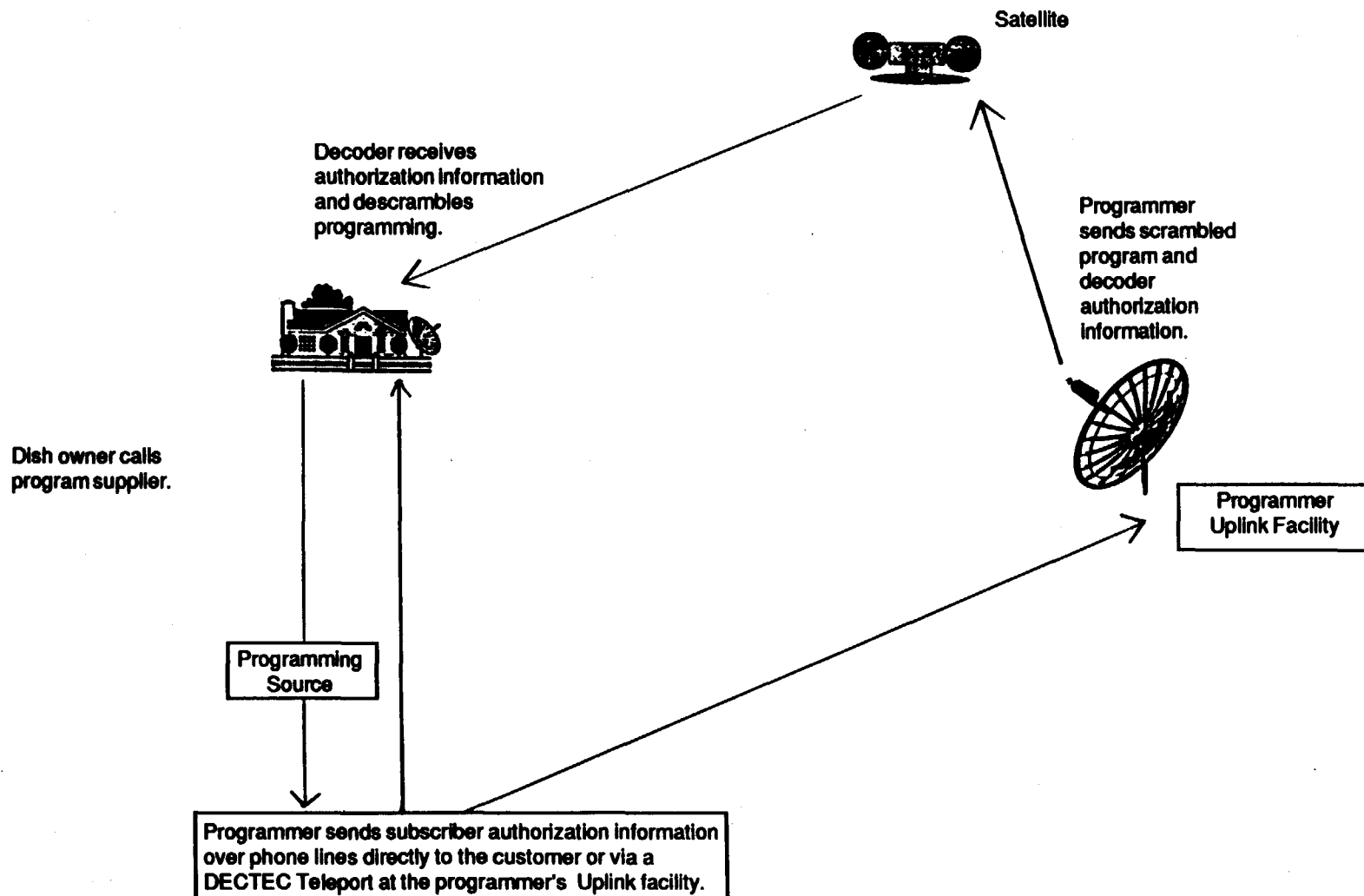


Shaded portions are re-programmable and configured by central processor every time power is applied. Therefore all these functions can be modified in the field.

Non-shaded portions are analog and require switched levels if multiple systems are to be emulated. Therefore, these primitive functions must be decided on at manufacture.

Authorizing SUN Decoders

Pictorial Representation



Economics of S.U.N. Scrambling System in a Private Network

- **Least expensive high-level security system for private communications and entertainment networks with global reach:**
 - › current business encryption systems range from \$1200 to \$3200 per decoder with encoders from \$17,000 to \$150,000
 - › authorization data centers can be built and controlled by S.U.N. network users at minimal expense
 - › initial expense is in LCAs allowing for inexpensive redundant encoders
 - › repair and servicing is very inexpensive
 - › upgrades are easy & cost effective (*requires software change through new smart card*)
- **High upfront development costs for design of logic-based universal architecture yields minimal costs for developing software enhancements, upgrades, and new system implementation.**
- **Marked reduction in cost of LCAs over next three years will keep product competitive.**

Possible Applications with S.U.N. Open Architecture

- **Backward compatibility:**

- › Oak Orion
- › **BMAC** (*requires ITT chipset*)
- › Others

- **Forward compatibility:**

- › DBS systems in Europe, Japan, United States
- › compressed video
- › advanced definition television

- **Proprietary systems:**

- › Customized encryption/decryption software for private networks (*corporate, government, education users*)
- › inexpensive add-on features and functions for scrambling systems currently in use (*ie. electronic program guides, newspapers, etc.*)

The Cost Economics of SUN

How SUN Saves Costs and Increases Profits

Conditions of Calculations		For Quantities Manufactured					
		2000 units	5000 units	10,000 units	15,000 units	20,000 units	30,000 units
Cost of VCII module	Monthly	\$650,000	\$1,625,000	\$3,250,000	\$4,875,000	\$6,500,000	\$9,750,000
	Yearly	7,800,000	19,500,000	39,000,000	58,500,000	78,000,000	117,000,000
Cost of SUN module \$275 ea (contracted out)	Monthly	550,000	1,374,000	2,750,000	4,125,000	5,500,000	8,250,000
	Yearly	6,600,000	16,500,000	33,000,000	49,500,000	66,000,000	99,000,000
	Yrly Savings	1,200,000	3,000,000	6,000,000	9,000,000	12,000,000	18,000,000
Avg. manufacturing cost of SUN per unit (includes all licensing fees & pre-programmed DallasCartridge) \$225 ea.	Monthly	450,000	1,125,000	2,250,000	3,375,000	4,500,000	6,750,000
	Yearly	5,400,000	13,500,000	27,000,000	40,500,000	54,000,000	81,000,000
	Yrly Savings	2,400,000	6,000,000	12,000,000	18,000,000	24,000,000	36,000,000
Volume manufacturing cost of SUN per unit (includes all fees & Dallas) \$200 ea.	Monthly	400,000	1,000,000	2,000,000	3,000,000	4,000,000	6,000,000
	Yearly	4,800,000	12,000,000	24,000,000	36,000,000	48,000,000	72,000,000
	Yrly Savings	3,000,000	7,500,000	15,000,000	22,500,000	30,000,000	45,000,000

Cost Comparison Summary

Considering current price of VCII module is \$325, and where IRD manufacturers license and manufacturer SUN module independently at cost of \$200 per unit, the satellite industry saves \$52.5 million dollars per year on module costs based on an estimated 35,000 systems sold in the U.S. each month.

	For Quantities Manufactured					
	30,000/mnth	25,000/mnth	20,000/mnth	15,000/mnth	10,000/mnth	5,000/mnth
Annual cost of VCII Module	\$117,000,000	\$97,500,000	\$78,000,000	\$58,500,000	\$39,000,000	\$19,500,000
Annual cost of SUN Module	\$72,000,000	\$60,000,000	\$48,000,000	\$36,000,000	\$24,000,000	\$12,000,000
Annual savings	\$45,000,000	\$37,500,000	\$30,000,000	\$22,500,000	\$15,000,000	\$7,500,000
Percentage saved	38%					